

Attitude of the Catholic Church Towards Evolution

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THE old charge that there is an irreconcilable opposition between the Catholic Church on the one side and the progress of art, literature, and science on the other, has been exploded so often that it should be unnecessary to deal any more with it. Unfortunately, as there is none so deaf as the one that does not want to hear, so there is none so hard to convince as the one that has deliberately made up his mind not to part with his error.

Many years ago it was the vogue, among the enemies of the Church, to bring forward the Spanish Inquisition as the most conclusive argument of the opposition, that was said to exist, between Church and science. But as, from every quarter of God's earth, hundreds of Catholics, one after the other, sedulously took up the argument and succeeded in showing its fallacy, the charge dropped out of fashion. But although, in that case, the enmity between Church and science was not proved, such an enmity, our adversaries said, must exist; and if it does not exist, we must concoct its existence. So, later on, and for a considerable number of years, they revived, before the eyes of the world, the already famous process of Galileo. It was, they claimed, an unanswerable proof that the Church is hostile to science. But there, again, Catholic apologists took up the cudgels for the Church, and in a vigorous and relentless attack they overthrew the accusation. As things are now, to say that Galileo was a martyr of science at the hands of the Catholic Church does not even attain to the magnitude required for a slanderous statement: it is simply a matter of ignorance and bad taste.

Nevertheless, on the part of the enemies of the Church, the main question is not yet settled. The latest endeavor to make people believe in the "necessary" conflict between

the Catholic Church and science has been nowadays centered on the question contained in the word "evolution." Evolution, they argue, is a scientifically established fact which the Catholic Church both discountenances and condemns; therefore the Catholic Church is hostile to science.

Has this assertion been proved? What is the Catholic Church's position with regard to the question of organic evolution?

Mention is made of organic evolution only, or of the evolution of living beings, not because it is in any way presumed that, on the authority of the evolutionists, the doctrine of Evolution holds only with regard to the plants and animals which live or have lived on this earth of ours, but because, although the doctrine is actually upheld by the out-and-out evolutionists to explain phenomena of the most different orders—cosmic, inorganic, organic, social and moral—it is particularly the organic evolution that, for the present, they are striving to establish as a scientific dogma, and it is peculiarly this evolution to which they accuse the Catholic Church of being necessarily opposed.

Restricting ourselves, therefore, to the consideration of the organic or living world, we observe that, among living things, plants as well as animals, there is an endless and most admirable variety; myriads and myriads of animals and plants, specifically different from each other, are living, and have lived, on this planet of ours. Between the microscopic alga and the magnificent eucalyptus of our Australian forests there is a stupendous diversity of organization; as between the microscopic unicellular *amœba* and the thoroughbreds of our race courses there is a gradation of complexity that baffles every attempt to classify it. How did such a variety of living things come into existence? Who produced them? Where did each one of these species get the invariable characteristics that distinguish it from all others? Did God Himself immediately shape each one of these organisms?

Two answers have been given to this question: one is in opposition to the other; but, leaving aside the question of the origin of man, both are alike in that, from a scientific point of view, they are neither more nor less than working hypotheses. Neither has been conclusively proved to be certain; and, if both have gained admittance into scientific circles, it is because, while affirming nothing

that is truly impossible or in opposition to well-established facts, either of them can satisfactorily explain a certain number of facts regarding the origin of the non-human living world.

The first answer that has been given to the above question is that of the advocates of the theory of unchangeableness of species. According to this theory, the invariable characteristics, or the specific marks that distinguish, not only the plants from the animals, but one class of plants from all others, and one class of animals from all other animals, have always been from the very beginning what they are at the present day. So that when, according to Holy Scripture, God said: "Let the earth bring forth the green herb and such as may seed," and "Let the waters bring forth the creeping creature having life, and the fowl that may fly," and "Let the earth bring forth the living creature in its kind, cattle and creeping things and beasts of the earth," all the species recognized by the zoölogists and botanists of our own days burst forth into existence as the immediate effects of God's creative power.

The second answer to our question is the one that concerns us in this lecture. It is based on a threefold supposition. Firstly, the supposition that all the actually living animal and plant species are genetically connected—that is, connected by descent with all the animal and plant species that have preceded them since the first germ of life appeared on this earth. Secondly, the supposition that the specific marks that distinguish the plants from the animals, and one class of plants or animals from all other classes, are due to the variability of the species. Animals and plants, placed in an environment different from the one they or their progenitors had when they came into existence, gradually undergo a true organic transformation. The better to adapt themselves to the conditions of their new surroundings, and by the action of natural causes, either they gradually develop new characters, or new organs, necessary or greatly serviceable for such an adaptation, or by a continuous disuse of some of the old ones, now detrimental or at least superfluous, they cause them to die out or to become atrophied. These newly acquired characteristic marks are always transmitted by inheritance to the offspring. The third supposition on which the theory of Evolution is based is that the transforma-

tions that all living species suffer uniformly keep an upward course; so that in their gradual changes plants and animals pass from a simple to a more complex organization, from an imperfect or lower form to a more perfect and higher one.

Such is the theory of organic Evolution. Resting upon its principles, the supporters of this theory positively assert that the plants and animals of today have not always been what they are at present. The manifold variety, the complexity that we notice in them, is nothing else but the outcome of an incessant evolution whose beginnings date from the day in which, for the first time, life appeared in its most elementary and imperfect form.

Is the Catholic Church necessarily hostile to this doctrine? Can a Catholic profess it without detriment to his Faith, or at least without in any way faltering in his allegiance to the directions which, concerning doctrinal matters, the Holy See has given to the faithful?

Before answering this greatly important question, let us remark that there is Evolution and Evolution. I mean that, besides the scientific theory whose general outlines we have just given, there are some other doctrines, going under the name of Evolution, that mix up with that theory many other assertions that have no bearing on it. There is an Evolution which, under the cloak of that doctrine, expounds the old errors of atheism, materialism, and pantheism. There is another Evolution that, amidst the arguments in favor of its doctrines, cunningly thrusts in all the desolation and hopelessness of agnosticism. The position of the Catholic Church with regard to these is obvious.

The atheistic, materialistic, and pantheistic Evolution, which is the Evolution held forth in the writings of men like Haeckel and Büchner, Vogt and Littré, is an Evolution that emphatically denies the existence of any personal Creator, of any extra mundane God. "A personal Creator," says Haeckel, "is only an idealized organism, endowed with human attributes; a gross anthropomorphic conception corresponding with a low animal stage of development of the human organism." It is an Evolution that maintains that the world is auto-existing; nobody created it; nobody produced it; it exists of itself, and it exists from all eternity. Together with whatever is present in it, non-living as well as living objects, plants, animals,

and men, it is the product of a merely mechanical, although always ascending, self-transformation. For it is a dogma of this kind of Evolution that, whatever is, is material; that there is no spiritual soul; that man is not more than a beautiful animal; that essentially different from the matter which we press down with our feet and shape into bricks with our hands, there is no intelligence that maps out, or has ever mapped out, the course of this matter's activities for the realization of a foreseen purpose. According to this doctrine, the world is moving and we are moving with the world in an unlimited space, as a derelict boat moves on the high seas, without aim, without freedom, and without anybody at the helm.

Agnostic Evolution, the Evolution advocated by men like Spencer, Huxley, Mansel, and Romanes, to mention only some of its better known supporters, is, perhaps, more widespread and certainly more destructive in its consequences. Where atheistic, or, as it is called, monistic, Evolution makes a positive assertion, there the agnostic one affects to suspend judgment. It is a kind of gentle scepticism, an apparently prudent doubt. Entrenched in all the principles of the most radical rationalism, it restricts the sphere of our knowledge to what only our senses can perceive; to what we can see with our own eyes, or observe with our microscopes, spectrascopes, and telescopes, to what we can examine with our scalpels and can test in our crucibles. Beyond and above this, we know nothing. We do not know, we are essentially incapable of knowing, whether a personal God, different from and superior to the world, exists or not; or whether He is the Creator of any or of all things. His nature, His attributes, His intentions, are as impenetrable to our minds as they are remote from our senses. For, as Mansel says: "The only voice which sounds back from the abyss where dwells the Being Whom we designate as the Absolute and the Infinite is a solemn warning that we possess no faculties which qualify us for the attainment of any knowledge of Him."

What they teach about God, they also teach about the existence, spirituality, and immortality of our human souls. Consequently, as whatever our senses perceive in us is purely animal, what we know, and the only thing we know, about man is that he is purely an animal. But as,

on the other hand, homologies or similarities in structure reveal identity of origin, and such homologies are found in all living creatures, so plants, animals, and men have sprung from one and the same identical stock. The differences which we perceive in them are but the best tangible proofs of this infallible dogma: the variability of living species. Their gradual perfection and complexity are the most accredited witness to this established fact: organic Evolution.

If at this point of my lecture you would ask me whether on the part of the Catholic Church there is any opposition to the doctrine of organic Evolution, I answer that to these monistic and agnostic theories of Evolution there certainly has been, there is, and there must always be the most irreconcilable opposition. But not because they are the doctrine of Evolution; no, but because they are the doctrines of Evolution infected right through with the most absurd and pernicious errors; not because the Church is hostile to science, but because in these expositions of Evolution the voice is indeed the voice of science, but the hands are the hands of atheism, materialism, pantheism, and agnosticism.

But, fortunately enough, not all the theories of Evolution are monistic or agnostic. There is a third evolutionist doctrine, an unalloyed, an unmixed one that, like the poet, does not aspire to send its javelin beyond the sun. As it has been already suggested, it is not its object to invent a new theology, nor to establish a new philosophical system; its scope is purely and simply to find out scientifically which are the causes that have produced the multiple existing variety of forms in the organic world.

The defenders of this doctrine, which is called the theistic theory of Evolution, are perfectly conscious of the position that human science holds in the scale of intellectual cognition; and as in consequence they admit and firmly believe in the existence of a personal God, Creator, and Lord of all things, Whose Divine Providence "reacheth from end to end mightily and ordereth all things sweetly," they admit and believe that our human souls are something essentially different from anything that is material, and that, although in this world of ours they exist in human bodies, they can, and as a matter of fact do, exist perfectly in the other without them; because even in their

activities their dependence on those bodies is merely extrinsic. As for their origin, they hold that the human souls, all and each of them, are directly and immediately created by God alone, and consequently that it is absolutely certain that man in his entirety—that is, body and soul—can in no possible way have descended from a brute animal, whether this might have been an anthropoid or not. But, after an honest and sincere profession of these principles, which are incontrovertible, both in sound philosophy and in our Christian Faith, they think that organic Evolution is the only scientific way satisfactorily to account for the innumerable, varied, and complicated facts of the living world.

To make matters a little clearer, let us distinguish in this theistic doctrine of organic Evolution what is called biological Evolution from anthropological Evolution. Biological Evolution is the doctrine of Evolution as applied to explain only the existence of all plants and lower animals. Anthropological Evolution is the doctrine of Evolution used as the means to solve the problem regarding the existence of man.

To explain the origin of the first living beings, the theistic theory of Evolution presupposes a special, immediate intervention on the part of God, by means of which one or more living unicellular substances were directly produced from non-living ones. But this presupposition, which at the present day is accepted by all the theistic evolutionists, is by no means essential to their doctrines; because if at any time it could be proved that life can be produced by the natural powers of non-living matter, that would only show that it does so at the will of the Creator and by virtue of the powers which He gave to it; and consequently the theistic doctrine of Evolution would still hold. For it is not the object of this doctrine to explain the origin of life upon earth, but to give a scientific explanation of its multiple varieties of forms.

To explain these, some of the theistic evolutionists hold that the entire world of vegetable and animal life has sprung, in the course of ages, from only one primitive form, the only one that God immediately produced. Others maintain that it has sprung from many—that is, from at least as many primitive forms as there are phyla or classes, both in the vegetable and animal kingdom. These,

and these only, were the immediate work of God. But both agree in that God endowed the species He immediately created with a nature susceptible of the most varied and complex transformations; in that He fixed the laws and determined the causes of these transformations, and in that He gave to these species and to all the ones which would be genetically connected with them, the power to reproduce themselves and to transmit to their offspring their nature with its newly-acquired characters.

As proofs of their assertions, they adduce arguments that they claim to be substantiated either by discoveries in paleontology, embryology, and morphology, or by the existence in almost all animals of the so-called rudimentary organs, or by the geographical distribution of the fauna and flora on the surface of the globe. All these facts, as interpreted by them, tend to prove with regard to plants and animals the three main hypotheses of organic evolution—namely, the variability of living species, their connection by descent from one to the other, and their gradually developed perfection.

Is the Catholic Church at variance with this doctrine, restricted thus far to the evolution of plants and animals? Is there anything in Holy Scripture or in the Catholic tradition, or in the decisions of ecclesiastical authority with which this doctrine may be truly and rightly said to be in conflict? Most certainly not. For, as regards Holy Scripture, although the words in the Book of Genesis: "Let the earth bring forth the green herb and such as may seed, and the fruit tree yielding fruit after its kind, which may have seed in itself upon the earth," etc., may obviously convey the idea that from the very beginning, the different natural and systematic species of plants and animals were all immediately created by God, yet the true interpretation of these words is by no means certain, according to some of the best exegetes. Father Corluy, S.J., for instance, thus expresses himself: "The Scripture does not say in what way did the earth produce all that variety of species, whether at once, simultaneously, or in the course of time; whether as species absolutely permanent or as only relatively permanent." And Father Knabenbauer, S.J., writes:

Considered in connection with the entire account of creation, the words of Genesis cited above proximately maintain nothing

else than that the earth, with all it contains and bears, together with the plant and animal kingdoms, has not produced itself, nor been the work of chance, but owes its existence to the power of God. However, in what particular manner the plant and animal kingdoms received their existence—whether all species were created simultaneously, or only a few which were destined to give life to others; whether only one fruitful seed was placed in mother earth, which, under the influence of natural causes, developed into the first plants, and another infused into the waters to give birth to the first animals . . . all this the Book of Genesis leaves to our own investigation and to the discoveries of science, if, indeed, science is able at all to give a final and unquestionable decision.

Several modern theologians and Catholic apologists have long since adopted the above interpretation, as, for instance, Heinrich, Tanqueray, Einig, Manens, Guibert, Duilhe de Saint-Projet, and others.

If we look now at what we have received through our Catholic tradition, it is enough to observe that among the Fathers of the Church and the old Catholic theologians, many were of the opinion that small animals like reptiles, fish, insects, worms and other creatures originated by what we call spontaneous generation, from decayed woods and fruits, from the hides and carcasses of animals, and from the muddy material of swamps and rivers. In our own days this opinion has been conclusively shown to be erroneous; but it implies, nevertheless, that, according to those Fathers of the Church and Catholic theologians, all the species of plants and animals were not the immediate product of God's creative power, and, consequently, that the theistic theory of Evolution as we have presented it is in no way contradictory to the Scriptural accounts.

Provided, therefore, that we readily proclaim God as the Creator and Lord of all things, and that we sincerely acknowledge His Divine Providence and cooperation with all and each of the secondary causes, the question of biological evolution is an open one. It is a purely scientific question to be discussed on purely scientific grounds. The Catholic Church is certainly not opposed to it.

The last point to be considered in connection with the theistic doctrine of Evolution, and one that has attracted even greater attention than all the previous ones, is that concerning the origin of man's body. I say of man's body, because in a theistic doctrine of Evolution there can be no question regarding the origin of man's soul. A human soul is a spiritual substance, and as such, as we have

already suggested, independent in its very existence of any material object. A human soul, therefore, could not have been produced and cannot be produced from any material substance, however well organized. This assertion is beyond a doubt even from a merely philosophical point of view. A human soul is the immediate work of God.

But as man is not soul alone, but soul and body, one is entitled to ask whether the theistic doctrine of Evolution might not be applied to the origin even of the human body; and if it is so applied, one may, further still, ask what is the attitude of the Catholic Church as regards the theory that the human body descends by evolution from lower animals.

Any theory of Evolution regarding the human body which implies that the whole human race has sprung from more than one pair of human beings is certainly in opposition to the Catholic Faith, and is emphatically rejected by the Catholic Church for that reason. It is a dogma of Faith in the Catholic Church that mankind is descended from one and the same stock, Adam, and it is a dogma of Faith also that all mankind who have come into existence according to the natural laws are, with the exception of Our Blessed Mother, born in original sin. The denial of the first dogma necessarily entails the denial of the second one; and this denial would mean the ruin of Christianity.

But this is not the way in which the doctrine of Evolution has been applied by Catholic writers to explain the origin of the human body. Catholics like Mivart, Leroy and Zahm held as a probable opinion that the body of Adam, and the body of Adam only, had attained to its human form through a process of evolution from lower animals, and that into this body God infused a spiritual soul immediately created by Him.

This opinion has never been condemned by the Catholic Church as infallibly incompatible with the Catholic Faith. But, at the suggestion of the ecclesiastical authorities, its supporters had to refrain from teaching and writing any more in favor of it. Later on, in June, 1909, a decree of the Biblical Commission for the Interpretation of Holy Scripture affirmed the non-evolution of man's body. As long as that decree stands, Catholics are bound in conscience not to teach the evolution of Adam's body from lower animals.

Here I beg to suppose that our adversaries would like to break in with the old saying: "The party accused has pleaded guilty." The Catholic Church discountenances the doctrine of the Evolution of the human body from lower animals. The Catholic Church is hostile to science.

But let us remember that, as everybody admits, science is not a knowledge of mere possibilities, nor an intellectual state of simple opinions; science is the knowledge of truth, and an intellectual state of certainty with regard to it. That no impossibility would be involved had the body of Adam descended by evolution from lower animals, nobody has ever thought of calling in question. God could certainly have arranged the plans of His creation in such a way that the body of Adam would have attained to its human form by a process of organic evolution. But it is not the possibility of that way of production; it is the fact of that manner of production that the anthropological evolutionists are called upon to establish. In the present state of their researches, who amongst them can come before the scientific world and lay down as an indisputable fact that the human body is nothing else but the outcome of an evolutionary progress, that began in a simple cell, and that, after passing through all the innumerable forms that vegetable, or at least animal, life can assume, reached its zenith in the organization of man's body?

Without entering into a minute analysis of all the arguments in favor of anthropological evolution, it is enough to observe that we have heard a great deal of the man of Trinil in Java, and of the Neanderthal man, and of the man of Le Moustier, and of Heidelberg, and of Piltdown, and of many others; but, as J. H. Kolbrugge, a non-Catholic, and a leading authority in evolutionism, says: "From the mere exposition of all the evolutionary hypotheses, everybody can easily be convinced that, regarding the great problem of evolution, we know nothing as certain." And as Ranke wrote, making use of the words of Dawkins: "We must admit that the study of fossils has not increased our knowledge as regards the origin of man, more than the study of historical documents." And as Marcellin Boule declared in the latest edition of one of his works: "We must confess, however damaging the confession may be to our *amour propre*, that we are still too ignorant to give a direct answer to Hux-

ley's 'supreme question' or to solve in full the perplexing problem of our origin."

When these men and many others, the best qualified to pronounce on the validity of the proofs brought forward to substantiate the evolution of man from lower animals, categorically declare that science does not know anything certain about it, is it fair to accuse the Catholic Church of being hostile to science because she does not rush to embrace that which scientific men are so lukewarm in upholding?

No, what the Catholic Church is hostile to, what she has thus far discountenanced and condemned in this question, is the overconfidence of some Catholic teachers and writers, who, disregarding the traditional interpretation of Holy Scripture on this very subject, take the animal descent of the human body as an undeniably established fact, when the chief foundations for that assertion are nothing more than either the interesting, but by no means conclusive, argument drawn from comparative animal morphology, or the well-discredited law of embryology, so strenuously propounded by Haeckel, or the doubtful, scanty, and incomplete fossils, which in some cases, rather too numerous, only a powerful imagination or a biased intellect can classify as the certain remains of an ape-man, or of a prehistoric animal ancestor of man.

The Scroll of God

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PERHAPS no department of knowledge, barring Revelation, furnishes clearer proofs for the existence of an All-wise and Omnipotent Creator than the science of astronomy.

We read in the first chapter of the Bible. "In the beginning God created heaven and earth" (Gen. i, 1). Here we have a clear and concise answer to the question. Whence is creation? That the material universe could not have made itself is evident; that it could not have been self-existent from eternity needs no proof; hence it must have been created. This view of the universe is based on

the teachings of sound reason and Divine Revelation, two beacon-lights given to man in order to illumine his path throughout life, and to safely conduct him to the blessed goal for which he was created. "Heaven and earth," or the entire material universe, was made out of nothing by the Omnipotent Creator. The initial act of creation was absolutely necessary in order to give that which before was only possible, *actual* existence. The constituents of the universe once created and set in motion, the mighty interchange of physical forces and elements began. Every particle of matter rushes towards or around some center of attraction. The atoms rapidly collect in masses of molten matter, and take form and shape. The stars, planets and solar systems gradually evolve from chaos. One of the many celestial bodies that eventually secure individuality and take spherical form is the earth. But "the earth is," still, "void and empty." "God," thereupon, "made a firmament, and divided the waters that were under the firmament from those that were above the firmament." When this little globe was sufficiently prepared, the vegetable kingdom appears on the scene. "And God said: Let the earth bring forth the green herb and such as may seed," v. ii. Vegetation bursts forth with great exuberance, assimilates whatever it finds congenial, and gains an easy victory over the material kingdom.

The vegetable kingdom, however, readily surrenders its sceptre at the bidding of the Almighty to a still higher class of creatures, who take possession of the air, sea and land. They enliven the earth, and dominate over its oceans and continents. "And God said: Let the earth bring forth the living creature in its kind, cattle and creeping things, and beasts of the earth according to their kind" (Gen. i, 24). But these, too, are destined to serve a higher type of creature.

After his home is sufficiently prepared by the elements, adorned with plants, and enlivened by birds, fishes, and animals, man goes forth from the hand of the Creator to "rule over the fishes of the sea, and the fowls of the air, and all living creatures that move upon the earth" (Gen. i, 26). "And God made man according to His own image" (Gen. i, 27).

A number of exegetes of eminent authority believe that this history of creation was revealed in visions.

No matter how the first chapter of Genesis be taken, it cannot be said that the "*Six Days*" must be days of 24 hours. Their real length of time is not determined by Scripture. It cannot be denied, however, that the book of Genesis is replete with difficulties; and, so long as the Church has not given an authoritative interpretation, the student of Scripture is more or less free to get what meaning he can therefrom. But no one can logically deny that its first and second chapter clearly and indubitably teach the origin of the universe by creation. They, likewise, teach that plants, animals and men owe their existence to separate and special creative acts.

Turning our attention to the other planets and stars in their relation to the earth, we are compelled by right reason, no less than by Revelation, to admit a creator, to whom, also, all the other spheres owe their existence. The accurate and harmonious movement of the solar systems, and the order and design which they reveal, force every unbiased and intelligent mind to admit the existence of a Supreme Being—a Wise Designer, Who called those spheres into existence and directs their every movement.

I say a *Wise Designer*. For wisdom is defined as the adaptation of means to the end, whilst design is defined as formal or intended order. Who can view the stupendous work of the universe and behold it in its entirety without being filled with awe and admiration at its order, precision and regularity—manifesting always the hand of a Wise Designer, and the sway of a Supreme Ruler.

The visible universe appears at its best on a bright and starry night when about 4,000 stars are discernible with the *naked* eye. With the aid of an ordinary opera glass about 100,000 can be seen, with each increase in the size of the lens, new stars are revealed, where before nothing save interstellar space was discernible. The great "Lick Telescope" on Mount Hamilton in California, which has a refracting lens three feet in diameter, reveals about 100,000,000 stars. The number of stars in the universe is, undoubtedly, much larger than of the visible stars.

Our amazement increases, moreover, when we reflect on the colossal bulk and volume of some of those mighty luminaries that adorn the firmament where among those bright constellations there are celestial orbs in comparison with which our little globe fades into insignificance.

The planet we inhabit has a diameter of 8,000 miles; the planet Uranus measures 32,000 miles through its center; whilst Neptune has a diameter of 35,000 miles. Saturn itself is 73,000 miles in diameter. Jupiter, the largest of the planets, is 1,300 times the size of the earth and has a diameter of 86,000 miles.

But even the largest of the planets is little when compared with the sun. The great luminary which the Almighty called forth from nothingness to preside over the day possesses a bulk of matter 318,000 times that of the earth and moon together; its diameter measures 850,000 miles. Again astronomers tell us many of the fixed stars are much larger than the sun and more luminous.

In spite, however, of the great diversity of size and weight among the heavenly bodies they all have a certain and fixed size and weight. The asteroids, of which there are about 600 known, exist in great number between the orbits of Mars and Jupiter, and all travel in the same direction. The smallest of the asteroids, which might more appropriately be termed planetoids, are, perhaps, only a few miles in diameter, whilst the largest are about 300 miles in diameter. Yet the smallest, as well as the largest, has a determined size and weight.

Now, has mere chance given those celestial bodies their size and density? Or have their size and density been determined, perhaps, by themselves? Certainly not by chance. *For an effect can never be superior to its cause.* But, one might say, they have been determined by the fixed and inherent laws of the elements which constitute those physical laws? Does not every law suppose a law-giver? Or whence came that primordial matter, the size and weight of which the physical laws have determined?

View the heavenly bodies as we will, we are compelled by right reason, no less than by Divine Revelation, to admit a First Creative Cause that called them all into being; and upon this First Creative Cause they depend for their existence and its continuance. Yes, the Almighty it was, "Who weighed the heavens in His Palm, Who has poised with three fingers the bulk of the earth" (Isaias xl, 12). He has "ordered all things in measure, and number and weight" (Wisdom xi, 21).

Again, no right-thinking man can contemplate the precise and intricate motion of the planets and stars, without

admitting an intelligent First Cause Who imparted to them the laws by which they are kept in their proper orbits and relative positions.

"Any particle of matter attracts any other particle with a force proportional inversely to the square of the distance between them, and directly to the product of their masses."

And motion in any material body causes motion,—although infinitely slight perhaps,—in all the others. In spite, however, of this constant and universal unrest, there is a total absence of lawlessness.

Our earth flies through space on its course around the sun at the rate of 18.5 miles per second.

The exterior planet Mars rushes on at the rate of 15 miles per second, and completes its somewhat centric orbit around the sun in 687 days.

Mercury, which is the nearest of all the planets to the sun, has a velocity of 29 miles per second.

Jupiter, the largest of the planets, travels at 8 miles per second and completes his course around the sun in 4,338 days.

Leaving the planetary realm for that of the fixed stars, here, also, shall we find all in motion. The name "fixed" star is a misnomer. There are no fixed stars in the strict sense. The vast majority of stars are said to be traveling at an average speed of 20 miles per second.

The area, too, or superficial extent of some of the celestial phenomena is beyond the comprehension of the strongest human mind. The comets, for example, those stray visitors that come from the stellar realm to pay their homage to the great monarch of our solar system, seem small to the naked eye. Yet the tails of these mysterious and beautiful apparitions vary from 10,000,000 to 100,000,000 miles in length. Halley's comet appears every seventy-sixth year and has come and gone about twenty-five times since the year 12 B. C.

Distance is defined as the extent of a straight line joining two points. It is easy to represent to ourselves the distance between here and some other city in importance. The task becomes more difficult, however, if we try and conceive the distance around the earth,—25,000 miles,—or the distance to the moon,—which is 240,000 miles,—or, again, to the sun,—which is 93,000,000 miles from here; of Mars, which is 141,000,000 miles from the sun;

Jupiter being 483,000,000 miles; Saturn 886,000,000 miles; and Neptune 2,793,000,000 miles, from the sun.

Beyond the orbit of Neptune, the farthest known planet, there is, all around the solar system, an immense ocean of space, which seems to contain naught save ether. Outside and beyond lies the boundless realm of fixed stars.

Seemingly lost amid the almost infinite space occupied by the visible universe, one of those millions of celestial bodies that are profusely scattered about in space inconceivable,—is this little planet we inhabit. From a material point of view, the earth, when compared with the rest of creation, is a mere atom; but when viewed from a higher and rational plane, it is the most important of all the spheres. The position of the earth in the solar system to which it belongs, evidently proves that, from the very beginning, it was destined to be the home of man. We know for certainty that our globe retaining that particular orbit distance from the sun, with its axial declination produce the four seasons of the year. No other planet is adapted for the muscular energy and temperament of man and brute. In this fact, alone, we have a beautiful specimen of design, and of the adaptation of the globe to the nature and constitution of its inhabitants. And yet we receive only a two-billionth portion of the heat and light given out by the sun.

The moon is our next door neighbor, much smaller than the earth, possesses neither light nor heat of its own, yet does us very good service. For, the tides which purify the oceans and prevent them from becoming stagnant, are due to the attraction of the moon. At regular intervals, too, the moon illumines our planet by reflecting the sunlight, which falls upon it. Owing to the fact that the moon revolves on its axis in just about the same time that is required for it to travel around the earth it necessarily presents but one side towards us. In spite of the great distance of the moon from us, the topography of the side which is constantly turned towards us is almost as well known as the topography of our own globe. Astronomers have observed several thousands of crater holes on the moon. The peculiar topography of the moon is due largely to the absence of air and water. Owing to the absence of an atmosphere life on the moon is impossible.

It is commonly believed that the universe is permeated

with a subtle substance, called ether, and that this substance is the seat of gravitation. Every material object is under the all-pervading influence of this hidden force. Owing to the universal law of gravitation which was discovered by Sir Isaac Newton (A. D. 1666), bodies attract one another in the ratio of their quantities inversely as the square of their distances. The entire visible creation, with its myriads of spheres, is kept in wonderful harmony by gravitation, combined with that tendency which all bodies in motion possess, of retaining the direction given them. By an artful combination, therefore, of the centripetal and centrifugal forces, imparted by the Creator, every sphere in the universe is kept in its proper orbit or path.

We have, then, a double bond of union that pervades the entire universe, and makes it a complete entirety. We, as well as the most distant objects in space, are permeated and influenced by both ether and gravitation. The smallest molecule of matter, no less than the largest orb poised in space, is under the absolute sway of these two forces.

Like an immense machine in motion, every orb of the visible universe contributes its share to the grandeur, unity, and harmony of the whole. There is no haphazard collision. Each and every planet follows its path at its prescribed rate of speed. All is beauty and harmony.

Man, gifted by God with intellect and talent, discovers stars and planets; and foretells the advent of transits, comets and eclipses with the greatest accuracy many years before they become visible.

Some years after the discovery of the planet Uranus, by Sir William Herschel, on March 13, 1781, it was observed that that planet was affected by an unknown star. Uranus was noticed to vary not a little from the course which it should have maintained, and that it occupied a position quite different from the one it would have held had none but known agents been exerting an influence upon it. Accordingly, Urban Jean Joseph Le Verrier, the astronomer in France, and John Couch Adams, in England, two of the greatest mathematicians of modern times, undertook to locate the whereabouts of a conceivable planet which could produce the disturbances noticed in the course of the newly discovered Uranus. On September 18, 1846, Le Verrier wrote to Dr. Galle, the astronomer in charge of the Berlin Observatory, requesting him to

direct his telescope on a particular spot of the sky, which was carefully indicated, "and there," said the great mathematician, you will find a planet which neither I nor any other human being has ever beheld. This astonishing prediction was literally true. The mischievous agent was discovered to be Neptune, a planet 2,793,000,000 miles from the sun and possessing a bulk 250 times that of the earth as calculated by Le Verrier, who was a pious Catholic.

Another great astronomer was Father Mathew Ricci, S.J., founder of the Jesuit mission in China, who died in Peking in 1610. As a European missionary and an astronomer he acquired great renown and his fame reached the Emperor of China, who summoned him to his court to be examined. The established astronomers reported that the foreigner's knowledge of astronomy was very limited. Father Ricci challenged them to calculate the next eclipse of the moon which was then soon to occur. Father Ricci was correct to the second, whilst the court astronomers were fifteen minutes wrong in their calculation. The Emperor demanded an explanation. "Your Majesty," replied their spokesman, "the explanation is simple; this stranger here bewitched the moon." "Well, then," said the Emperor, with a smile, "you shall continue to be servants of the moon, but I constitute this man her controller."

The learned St. Athanasius well says: "When we see a work of an excellent sculptor, we recognize the hand of the unseen artist in the proportion of the parts and grace of the whole; so the visible universe tells of the unseen Creator. The motions of the heavenly bodies, so orderly, yet so diversified, irresistibly lead to the conviction that they are under guidance." Yes, with the royal Psalmist we are compelled to exclaim: "The heavens show forth the glory of God and the firmament declareth the work of His hands" (Ps. xviii, 2). They are indeed the work of the Almighty, of Him "Who sendeth forth light and it goeth; He hath called it, and it obeyeth Him. And the stars have given light in their watches and rejoiced; they were called and they said: Here we are; and with cheerfulness they have shined forth to Him that made them" (Baruch iii, 32 *sqq.*).

A sufficient intelligence, contemplating the God given course of the various parts of God's great work, could tell with the greatest accuracy their relative collocation at any

definite hour, minute or second. The celebrated mathematician, Marquis La Place, President of the French Academy (1817) in the reign of Louis XVIII, King of France, has proved that on Newton's theory of gravitation the planetary system would endure for ever, and has given us indisputable proof that the period of the earth's axial rotation has not changed the one hundredth part of a second of time in two thousand years.

Everyone, therefore, of sane mind can attain to a certain knowledge of God from the contemplation of His handiwork, the visible universe. That there exists an All-wise Creator from Whom all things have their being, is a truth that forces itself upon us at every turn. The entire universe testifies to it. Hence we find that there never has existed a nation, or a tribe, that has not possessed a knowledge of the Deity. The first nation, or even community, of sincere atheists or infidels, has yet to be found.

Hence it is, that the Sacred Scroll blames the man, who does not possess this essential knowledge and closes his eyes to the book of nature. "By the greatness of creatures," says the book of Wisdom, "the creator of them may be seen, so as to be known thereby." A clear idea of God, therefore, as He is reflected from the visible universe, can easily be secured by every man of sane mind and sound judgment; and the man who rejects his belief in God must struggle against his better judgment in order to become an infidel. He, therefore, is utterly wrong who asserts that "creation is one conglomerate conjecture," or, "that we can only guess at truth," and, "that the unanswerable questions of 'whence' and 'why' linger eternally on our lips." These questions are easily answered: they are answered in unmistakable terms, both by science and by Divine Revelation,—by Astronomy and Religion.